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Icelandic Odyssey: Navigating Challenges in Modern Aerobiology through the Transition from Manual to Automatic Pollen Monitoring Systems

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Background:
Iceland, the second-largest island in Europe at 103,100 km2, exhibits unique biogeographical characteristics due to its location between Europe and North America and its position at the boundary of the Arctic and Boreal regions. The climate is influenced by various air masses and ocean currents, resulting in unstable weather conditions. The vascular flora of Iceland, originating postglacially, consists of 426 native taxa. Unlike counterparts in Greenland and Scandinavia, Icelandic flora features a distinctive Atlantic-European element, particularly abundant in the Arctic and Subarctic regions.
Methods:
Pollen concentrations in the air in Iceland are monitored from April/May to September every year in two main towns: Reykjavík (SW Iceland, since 1988) and Akureyri (N Iceland, since 1998). Daily average pollen grain numbers were collected using the volumetric method with the Burkard Seven-Day Volumetric Pollen Trap. Since July 28, 2022, pollen monitoring in Akureyri has also been conducted by the automatic Pollen Monitoring System, Swisens Poleno Mars. The automatic system covered two grass pollen seasons and one birch pollen season. A comparison was made between both measurement instruments, using basic statistical methods such as the Pearson correlation coefficient.
Results:
Long-term pollen monitoring data reveals a low diversity of airborne pollen in Iceland's aeroplankton. Betula spp. and Poaceae are the most common pollen allergens. Iceland's pollen seasons exhibit a delayed onset compared to continental Europe. While daily grass concentration results from both devices follow similar patterns, detailed analysis reveals numerous false positive events. After tuning the grass pollen identification method, it is now satisfactory. Besides grass pollen, birch pollen is another crucial type in Iceland. In 2023, testing with Polleno Mars revealed numerous false positive events, indicating a need for further refinement in Betula pollen classification.
Conclusions:
The introduction of automatic pollen monitoring systems requires time (more than one pollen season) to adjust the system to local conditions. Tuning each pollen taxon separately is crucial. The Swisens Poleno Mars in Iceland has offered valuable insights into pollen seasons, particularly in grass pollen identification. However, ongoing efforts are essential to refine Betula pollen classification for a comprehensive understanding of Iceland's aeroplankton.

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